Massachusetts Space Grant Consortium
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Consortium URL: www.maspacegrant.org
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PROGRAM DESCRIPTION

The National Space Grant College and Fellowship Program consists of 52 state-based, university-led Space Grant Consortia in each of the 50 states plus the District of Columbia and the Commonwealth of Puerto Rico. Annually, each consortium receives funds to develop and implement student fellowships and scholarships programs; interdisciplinary space-related research infrastructure, education, and public service programs; and cooperative initiatives with industry, research laboratories, and state, local, and other governments. Space Grant operates at the intersection of NASA's interest as implemented by alignment with the Mission Directorates and the state's interests. Although it is primarily a higher education program, Space Grant programs encompass the entire length of the education pipeline, including elementary/secondary and informal education. The Massachusetts Space Grant Consortium (MASGC) is a Designated Consortium funded at a level of $575K for fiscal year 2013.

PROGRAM GOALS

The following are the Consortium's goals for the three NASA education outcomes:

NASA Education Outcome 1 – Educate and Employ

a. Diversity

MASGC Goal – Extend Space Grant programs and opportunities to the broadest possible cross-section of the Massachusetts population, particularly encouraging participation by women, underrepresented minorities, and students with disabilities.

b. Fellowship/Scholarship Program

MASGC Goal - Provide NASA competency-building education and research opportunities to develop qualified undergraduate and graduate students who are prepared for employment in STEM disciplines at NASA, the aerospace industry, and higher education.

c. Research Infrastructure Program

MASGC Goal – Provide research fellowships to as many Massachusetts students as possible to enable them to work with faculty members and/or researchers during the academic year and during the summer.

d. Higher Education Program

MASGC Goal – Recruit the best students from our consortium to participate in NASA programs, including the Academies, and in internships with aerospace companies involved in NASA-related work

NASA Education Outcome 2 - Educate and Engage

Precollege Education

MASGC Goals –

- Encourage teachers to incorporate STEM instruction in their classrooms, using NASA content as much as possible.
- Provide continuing in-service opportunities to help teachers maintain competency in STEM instruction and results in deeper content understanding and/or competence and confidence in teaching STEM disciplines.

NASA Education Outcome 3 – Engage and Inspire

Informal Education and outreach

MASGC Goals –

- Enhance interest and proficiency in STEM disciplines.
- Inform the public about NASA's mission activities.
- Develop a pool of qualified presenters to communicate significant aerospace and climate-related issues to large audiences.

PROGRAM/PROJECT BENEFIT TO OUTCOME (1,2, & 3)

The following are examples and anecdotes of NASA competency-building education and research opportunities, which MASGC funding has enabled.

Scholarships and Fellowships to undergraduates at our four-year and community colleges or to graduate students at our larger member universities benefit our goals for NASA Educate and Employ Outcome 1, supporting education, research and higher education for skills related directly to NASA missions. The Rocketry program at the Science Club for Girls benefits our goals of diversity in Outcome 1, since all the girls in the program are underrepresented minorities in inner city middle and high schools.

1. ***Undergraduate Fellowships at Community Colleges***

"The opportunity afforded by Space Grant funding encourage and assist my career plans. My grant was applied towards tuition for the 2013 NASA UAV and Helicopter Workshop. I was able to apply what I learned about UAVs and the science of helicopter flight to my engineering studies even though I am studying civil & environmental engineering. I realized the enormous potential and accessibility of using UAVs in environmental remote sensing. I may consider constructing and developing UAVs for this purpose as part of my senior thesis or for use in my graduate work, as I plan to attend graduate school.

I also have been using what I learned about helicopter flight to influence design ideas in regards to vibration and in applications that may include turbine-like components (i.e. wind turbines). I was exposed to very much knowledge that I do not think I would have gotten to study otherwise. I think it will make anyone who had attended the workshop a better engineer or even a better student in whatever they plan on majoring in because one can understand, relate, and integrate topics from other areas of engineering.

Also, I was particularly interested in the fact that the workshop was a program designed to advance STEM topics to students. I am very much interested in STEM education. I plan on working in research however I also plan on spending some of my career as an educator with the intent to advance STEM education. I think this is a perfect example of the programs that we can create to get people excited about science and technology".

Mariam Alkattan – Holyoke Community College

2. <u>January Operational Internship at KSC</u>

"I can't thank you enough for championing this program in the past and now. These two short weeks have radically transformed my view of NASA as a space program and specifically KSC as a NASA center focused on launch operations. Before this January I assumed NASA KSC relied heavily on heritage procedures and practices as far as launch vehicle servicing and operations were concerned. I viewed launch vehicles and ground operations to be an area of aerospace engineering with small margins for improvement or flexibility. Now, however, after my experiences with MIT and Stanford's JOI, I recognize KSC as the leader in large-scale launch operations management and service development in the United States and in the world, and a center for active design of next-generation spaceflight launch and support operations hardware and software. Not only was I surprised with the willingness of KSC divisions to take a fresh look at ground support equipment and strategies for attracting a quickly growing commercial space sector, but I was blown away by the advanced capabilities employed in the daily activities at KSC, including visualization lab products and LETF analysis tools, among a myriad of other examples that span GSDO, SLS and Orion. Through our talks with NASA employees and contractors, I was able not only to hear about the vital importance of maintaining awareness of operability while designing aerospace systems, but I was also able to see the process first-hand.

I am immensely grateful for being afforded such an unprecedented opportunity, such an intimate view of NASA KSC's operations and inner-workings. I am a first-year graduate student at MIT now in Aero/Astro and I can honestly say that my experiences in these few short weeks have opened my eyes to issues and strategies that will significantly improve my chances of developing efficient, cost-effective and lasting spacecraft systems for the next generation. I only hope that other students like me will be given a similar opportunity in future JOI programs, if not for the powerful and lasting impression of a world-class facility and center for operations design and management, but for the benefit of the projects those future students will be involved with following their JOI experience throughout their entire career.

-Todd Sheerin, MIT Aero/Astro Graduate Student

3. <u>Science Club for Girls</u>

The Science Club for Girls is a Cambridge-based nonprofit that seeks to increase the confidence and literacy in science, engineering, technology and mathematics for girls, especially those from underrepresented groups. The Club connects girls in K-12th grades with mentors in these fields who guide them in hands-on projects and explorations.

The goals of the Rocket Team at the Club are to increase girls' interest in engineering and design, develop their skills in these technical areas, and to connect them with male and female mentors and role models engaged in these fields. We specifically target girls from underrepresented racial/ethnic groups, especially those living in Boston and Cambridge. Funding from MASGC the past few years have allowed teenage girls from Cambridge and Boston to participate in the Club's Rocket Team.

The girls meet weekly for 2 hours and are mentored by employees from Aurora Flight Sciences and graduate students from MIT's Aero-Astro Department to gain experience and knowledge in aeronautics and rocket design, using RockSim software. This enables them to build rockets, which the then launch and observe how their flight behavior compares to predictions. This year, the students also took a field trip to visit the Boston University Rocket Propulsion group and the BU rocket team. They presented their work in the spring at the Cambridge Science Festival.

PROGRAM ACCOMPLISHMENTS

A. The consortium has exceeded each of the goals in Outcome 1, i.e. "Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goals", except for supporting students at NASA Centers. The Consortium has had to reduce the number of NASA internships and NASA Academy fellowships it awards because of a combination of budget constraints and the large number of students engaged in aerospace related research within the state who are benefitting from internships at our affiliate campuses.

We note that the JOI program at the Kennedy Space Center could not be held in 2013 because of changes in personnel at KSC and the retirement of the Shuttle program, around which the JOI program had originally been developed. The consortium has worked with KSC personnel to restructure the program around future commercial space activities at KSC, and the JOI program was reinstated in January 2014, which will be reported in next year's APD.

B. The results for Outcome 2, " Attract and retain students in STEM disciplines through a progression of educational opportunities for pre-college students and teachers" are satisfactory, because we have deliberately shifted some of the programs to NASA's Summer of Innovation program in Massachusetts (MA SoI). The MA SoI initiative, which has been active since 2010, was intended solely to support pre-college students and teachers, and it is being conducted in partnership with our consortium members. Both Space Grant and the Summer of Innovation are NASA programs, and the management and participants in Massachusetts are essentially the same. Given the extra SoI support for pre-college, the Consortium has shifted some Space Grant funding from pre-college to higher education, in response to the needs of our members and the state.

Of note in this outcome is that MASGC arranged for the first Northeast regional collaboration in teacher professional development and hosted a robotics workshop for teachers. At least two teachers from each Northeast Region state participated in the workshop this past summer, which was held at Tufts University.

In addition, the consortium has participated in numerous high-profile STEM initiatives in the Commonwealth. The Co-Director serves on the Governor's STEM Summit Planning Committee and has also participated in the Cambridge Mayor's STEM Roundtable. These efforts enable the consortium to provide publicity for the NASA education mission at every level of STEM education establishment in Massachusetts.

C. The consortium has also exceeded each of its goals in Outcome 3, i.e., "Build strategic partnerships and linkages between STEM formal and informal education providers that promotes STEM literacy and awareness."

The following tables show specifics of MASGC's performance metrics, outcomes, and achievements:

Outcome 1: Contribute to the development of the STEM workforce in disciplines needed to achieve NASA's strategic goal Educate and Employ

MASGC Objectives	Proposed Metrics	Outcome	Achievement
Diversity	1. Offer at least 25 student fellowships for higher education and research.	1. Awarded 62 student fellowships for higher education & research	1. Exceeded metric
Scholarships Fellowships	2. Maintain minority participation at ≥15%.	2. Increased minority participation to 16.1%	2. Exceeded metric
Higher Education	3. Involve at least 8 academic affiliates including western MA.	3. Awards made to 18 academic affiliates statewide	3. Exceeded metric
Research Infra-structure	4. Expose at least 15 undergraduates to space- or climate-related research.	4. Provided 45 fellowships to undergraduates to work on space-related research.	4. Exceeded metric
Aerospace STEM	5. Place at least 10 students at NASA or JPL centers.	5. Supported 3 students at NASA Centers.	5. Reached 50% of metric. (See Section A, above.)
	6. Send 8 Massachusetts students to KSC for the JOI program.	6. Program suspended in 2013, reinstated in 2014.	6. (See Section A, above.)
	7. Integrate NASA resources into at least 1 STEM project.	7. Support SSEP program at Monty Tech School to conduct one experiment annually on the ISS.	7. 2013 Monty Tech payload is scheduled to launch to the ISS on 10 June, 2013. Met metric.

Outcome 2: Attract and retain students in STEM disciplines through a progression of educational opportunities for pre-college students and teachers to achieve NASA's strategic goal Educate and Employ.

MASGC Objectives	Proposed Metrics	Outcome	Achievement
Teacher Professional Development	1. Support at least one workshop targeting teachers from underserved areas in the state or teachers for students with disabilities.	1. Organized and supported a teacher workshop at Tufts University in summer 2013. Planning another workshop in summer 2014	1. Met metrics (See section B, above)
Hands-on activities for K-12 students	2. Support the participation of at least 10 schools in the Space Explorers program.	2. Program was discontinued by the organizers.	2. N/A
	3. Bring at least 25 inner-city students to the Challenger Learning Center who would normally not be able to attend.	3. Brought 46 inner-city students from Worcester and 105 from the Cambridge Public School District to the Challenger Center. 95% of the students receive free or reduced lunch.	3. Exceeded metrics
	4. Expose at least 200 K-12 students to NASA-related research.	4. Exposed 220 K-12 students.	4. Exceeded metrics
	5. Conduct at least one scientific ballooning launch.	5. The ballooning program at Kuss Middle School is dormant due to personnel changes,	5. SSEP program at Monty Tech achieves better NASA-related hands-on experience.
	6. Engage at least 5 students in rocketry competitions or similar hands-on activities.	6. Engaged 9 girls from the Science Club for girls in rocketry.	6. Exceeded metrics
	7. Include the Perkins School for the Blind as a consortium member.	7. The school is unable to meet the obligations needed to become a full member.	7. The school will continue participation in selected MASGC activities.

Outcome 3: Build strategic partnerships and linkages between STEM formal and informal education providers that promotes STEM literacy and awareness to achieve NASA's strategic goal to Engage and Inspire.

MASGC Objectives	Proposed Metrics	Outcome	Achievement
Support Informal STEM education	1. Have at least 200 students and teachers attend Space Day.	1. Over 1100 teachers and STEM education stakeholders attended the STEM Summit.	1. Exceeded metrics
Organize events with NASA themes and content. Increase public Awareness about Aerospace and NASA. Inform public about NASA's mission.	2. Have at least 100 people attend the annual Space Grant Distinguished Lecturer Talk	2. Over 140 people attended the Annual Public Lecture given by NASA Astronaut Don Pettit.	2. Exceeded metrics
Develop qualified presenters to interact with the public on aerospace and climate-related issues	3. At least 5 Massachusetts informal educators should participate in McAuliffe Challenger Center.	3. Arranged for 7 informal educators and parents to attend the Challenger Center.	3. Exceeded metrics
	4. At least 10 Museum of Science informal education staff should attend the annual Space Day activities.	4. Held Teacher Training workshop at the Museum of Science to which 25 informal educators/teachers attended (summer 2013). Planning a similar workshop for summer 2014.	4. Exceeded metrics

PROGRAM CONTRIBUTIONS TO NASA EDUCATION PERFORMANCE MEASURES

- **Student data and Longitudinal Tracking**:

Starting in 2006, MASGC has carried out longitudinal tracking of students who have participated in the Consortium's programs. We have added extra time for support staff in our budget to support this activity. So far, most of our awardees are still in school. However, we have been tracking our students' career plans to get an estimate of whether they have plans for research, education or employment in aerospace or other STEM-related areas.

Of the 510 students who have graduated from the initial degree they were pursuing when supported by MASGC, 244 are pursuing advanced STEM-related degrees, 34 are actively seeking STEM employment, 72 are employed by aerospace contractors, 51 are employed in non-aerospace STEM positions, 10 are employed by NASA/JPL, 11 are employed in K-12 STEM, 31 are employed in "other" STEM academic fields and 57 in non-STEM employment.

- **Minority-Serving Institutions:**

The Consortium's members include Roxbury Community College, the Commonwealth's only designated "minority-serving institution". Attracting community college students to aerospace-related activities is challenging, because aerospace is a field of endeavor most of the students have not thought about. Therefore, MASGC offered fellowships and a STEM seminar series to community college students, to encourage them to enter the aerospace workforce pipeline. It is, in effect, a "Scholarship for Service" program for the inner city minority population in Massachusetts. We have continued our annual funding for at least one Roxbury Community College student to spend the summer at MIT or Draper Lab. This summer, we have one student, working on advanced space suit development in the Man Vehicle Laboratory. One of the 2013 summer students, working in MIT's Aero/Astro nanotechnology laboratory, did such a fine job that he was retained by the supervising professor for the entire 2013-2014 academic year. All students who have participated in this program over the past three years have gone on for a 4-year college program in engineering.

- **NASA Education Priorities:**

1. Hands-on learning

The consortium is engaged in and enables various hands-on student experiences in science and engineering disciplines examples of which, Rocket Teams both at the Science Club for Girls, described in the highlights above, and at MIT, are:

The Belmont Community School in Worcester is an inner-city school in Western Massachusetts with over 95% of the students receiving free/reduced lunch. The consortium worked with the

Challenger Center to enable 46 middle school students to attend the McAuliffe Center Program "Voyage to Mars", along with a Planetarium production. In a simulated space shuttle mission, students engaged in a cooperative learning environment involving the challenges of teamwork and problem solving to land a probe on Mars. Students also attended a planetarium presentation, The Tilt, which explores the changing seasons on Earth. In addition to being a hands-on program, this met may of the state's science and math standards.

MASGC enabled the Cambridge Public School District to make 2 visits to the McAuliffe Center. The students learnt about space missions by assuming the jobs of the technicians, scientists and engineers needed for a space mission. The students also visited the planetarium to learn the motion of planets, the relative size of planets, the size of the universe, and to help students visualize the constellations. 105 students attended on two separate days.

The MASGC Director gave a presentation on space travel to ~20 underrepresented minority students at the Boys and Girls Club of South Boston, as a kickoff to a year-long "space club" activity designed to interest the boys and girls (mostly middle school age) in technical studies through having them build model rockets, space stations, etc. and learn how they operate. He also spent a day at the MIT Museum during the Cambridge Science and Engineering Fair week, to give students and their parents a chance to handle space suit hardware and learn about how space suits function.

2. Curriculum Enhancement for middle school teachers

In an effort to engage middle school teachers in curriculum enhancement capabilities through exposure to NASA scientific and technical expertise, MASGC has been working with the Museum of Science, a MASGC affiliate, to organize a STEM teacher training activity using the Museum's newly refurbished Planetarium.

The initial activity, a "test program", was held in the spring of 2013. The theme was the expansion of our concept of our universe through the increasing power of our telescopes, with special emphasis on the Hubble Space Telescope. Planetarium School Coordinator and Presenter Amanda Thompson led an hour-long Planetarium presentation in which she transported eighteen K-12 teachers and seven guests, from the near-Earth orbit of the Hubble Space Telescope to the farthest reaches of the universe that Hubble has been able to penetrate. Special commentary was given by MIT Professor Jeffrey Hoffman, Director of the Massachusetts Space Grant, which paid for the use of the Planetarium for this activity. Dr. Hoffman is a former NASA Astronaut, whose spacewalks on Shuttle mission STS-61 in December, 1993 helped correct the HST's initially flawed optics and turned it into the incredible scientific success that it has become. Following the presentations the teachers worked with members of the Museum's teacher enrichment team to determine what parts of the morning's subjects could be worked into their curricula. The program received excellent reviews. One of the numerous comments:
"I have not stopped talking about this program since attending. When I was in third grade, I refused to believe that there was anything outside our world. I still find it hard to believe, but through presentations and hearing first-hand experiences from astronauts, such as Jeff Hoffman, my understanding increases on Climate Change/Global Warming. "The Hubble" presentation was great. Thank you for finding ways to enlighten me. I loved the class!!!!!"

Professor Hoffman has continued to work with the Planetarium in developing a recorded planetarium show emphasizing the work that engineers do in designing space missions. Another teacher workshop is planned for August 2014, which will be included in next year's activity report.

3. College and University Student Fellowships

Higher education is at the top of MASGC's priorities, and summer opportunities for students receive the largest allocation in our budget. We award almost all higher education funding as fellowships, given directly to students, which avoids institutional overhead charges. During this academic year, MASGC awarded 7 fellowships to students from 6 affiliate schools, including Roxbury Community College. This summer, the Consortium is funding 33 summer internships at 14 affiliate institutions. As an example of the kinds of studies that MASGC supports, two typical projects are:

- "Finite Element Analysis and Signal Processing for Pyrotechnic Shock in Spacecraft"
  A study of how spacecraft payloads can be isolated from pyrotechnic shocks arising from the explosive separation of spacecraft sections during launch and/or deployment.
- "Aeroelastic and Vibration Energy Harvesting"
  A study involving the design, fabrication and testing of electromagnetic induction devices to convert ambient vibration and aeroelastic-induced oscillations of an airfoil into electricity.

4. Community Colleges

The consortium helped develop and provide speakers and funding for a 12-part STEM series at the Roxbury Community College, which has been running for several years, with on the average ~30 minority students attending each lecture, which exposes them to various STEM disciplines including aerospace. In 2014, RCC is holding this lecture series in the summer, to attract a different set of students, and MASGC will continue to support this activity.

5. Student Travel Opportunities

In keeping with MASGC's guiding principle of using Space Grant funding to enable students to engage in NASA-relevant activities they would otherwise not have access to, we provide funding for students to attend conferences in which they will present a research paper or poster, or to attend aerospace-related competitions. This year, we funded 5 students to attend conferences, including American Astronomical Society meetings and a Space Power Workshop.

6. Aerospace Research Seminar

MASGC sponsors a "Modern Space Science and Engineering" seminar course to introduce students to contemporary space research. The presentations deal both with the important scientific questions involved in the research and at the same time with the engineering challenges that must be met in order to carry out the research in the environment of outer space. The course

is open to all consortium members and to the public. Approximately 300 students and 50 members of the public attended the seminars.

Presentations were made by:

1. Dr. Geoffrey A. Landis, Research Engineer, NASA John Glenn Research Center; "Zephyr: Windsailing on Venus"
2. Prof. Jeffrey Hoffman, MIT Aero/Astro; "EVA - Walking and Working in the Vacuum of Space".
3. Prof. Frank Centinello, MIT EAPS; " Orbit Determination and Gravity Modeling with the Dawn Spacecraft at Vesta"
4. Prof. Tom Herring, MIT EAPS; "Geodetic Imaging in Space and Time"
5. Prof. Tom Filburn, Univ of Hartford; "ECLSS for Long-Duration Human Space Flight"
6. Prof. Richard Binzel, MIT EAPS; "Exploring Asteroids"
7. Prof. Scott Messenger, Univ. of Maryland; "TacSat-4 Radiation Environment and Solar Cell Degradation Correlations Using Onboard Experiments"
8. Dr. Giovanni Fazio, Harvard-Smithsonian Center for Astrophysics; "Infrared Astronomy with the Spitzer Great Observatory"
9. Dr. Gerald Sanders, In-Situ Resource Utilization Chief Engineer, NASA JSC; "In-Situ Resource Utilization (ISRU) for Future Space Exploration"
10. Dr. Kate Rubins, NASA Astronaut; "Science in Extreme Environments: Building Extraterrestrial and Earth-based Research Capabilities"
11. Astronaut Don Pettit, NASA Astronaut (Annual Space Grant Distinguished Lecturer); "Techno-Stories from Space"
12. Dr. Byron Lichtenberg; "Perspectives on the Evolution of Commercial Spaceflight"

IMPROVEMENTS MADE IN THE PAST YEAR

MASGC has made the following adjustments to maximize the benefits from reduced funding, changes in programs and increase the consortium's involvement in the state's education system:

Speaker support: The line item in MASGC's budget supporting speakers for public lectures at affiliate institutions has been underutilized over the past few years. We reemphasized the availability of this support at our last two annual consortium meetings, and this past year three consortium members used MASGC funding to support outside lecturers giving space-related talks at their institutions. All such talks are open to the public and are advertised as MASGC-supported events. We will continue to encourage more affiliates to hold MASGC-supported public lectures.

STEM development: In addition to being a member of the statewide Massachusetts STEM Council, MASGC's Co-Director has joined the local Cambridge city STEM initiative.

STEM Teacher Training: After a prolonged planning period, MASGC and the Museum of Science held a K-12 teacher training workshop, utilizing the Museum's newly refurbished

Planetarium and featuring results from the Hubble Space Telescope. We are planning a similar workshop in August 2014 and intend to make such workshops annual events.

Student Space Experiments Program: MASGC has provided support for several ISS experiments carried out by students from the Monty Tech Regional High School in Fitchburg, MA. In order to provide continuity for this program and make it sustainable, MASGC has now incorporated funding for this program as a line item in the annual budget. This means that Monty Tech can count on being able to conduct one experiment every year and can start planning for this much earlier than if they had to wait until financing was secured. MASGC funding serves as a catalyst for additional community funding, which is critical to this activity. Jeff Goldstein, the director of the SSEP, tells us that he is using MASGC's support as a model to try to develop sustainable programs in other states.

The University of Massachusetts at Lowell applied for and has been accepted as MASGC's newest affiliate institution, bringing the total to 20.

PROGRAM PARTNERS AND ROLE OF PARTNERS IN PROJECT EXECUTION

Currently, the Massachusetts Space Grant Consortium has 20 academic affiliates and 2 institutional (outreach) affiliates, covering the entire state from Cape Cod to the Berkshires. Members are listed below, together with the name of each affiliate's representative to MASGC:

Academic Affiliates

Massachusetts Institute of Technology, Lead	Professor Jeffrey Hoffman
Boston University (Boston)	Professor John Clarke
Bridgewater State University (Bridgewater)	Professor Martina Arndt
College of the Holy Cross (Worcester)	Professor Matthew Koss
Framingham State University	Dr. Irene Porro
Five College Astronomy Department	Dr. Alexandra Pope*
Harvard University (Cambridge)	Professor Jonathan Grindlay
Massachusetts College of Liberal Arts	Professor Michael West
Mount Holyoke College (South Hadley)	Professor Darby Dyar
Northeastern University (Boston)	Professor Alain Karma
Olin College (Needham)	Professor Christopher Lee
Roxbury Community College (Boston)	Dr. Tala Khudairi
Tufts University (Somerville)	Prof. Danilo Marchesini
University of Massachusetts (Amherst)	Prof. Daniella Calzetti
University of Massachusetts (Dartmouth)	Professor Robert Fisher
University of Massachusetts (Lowell)	Prof. Supriya Chakrabarti
Wellesley College (Wellesley)	Professor Kim McLeod
Williams College (Williamstown)	Professor Jay Pasachoff
Worcester Polytechnic Institute (Worcester)	Professor Nikolaos Gatsonis
Worcester State University (Worcester)	Professors Sudha Swaminathan and Frank Lamelas

* Five-College Astronomy Department, which in addition to Amherst, Mount Holyoke and UMass, also includes Hampshire and Smith Colleges.

Institutional Affiliates (Outreach)

Museum of Science (Boston)	Mr. Paul Fontaine
Christa McAuliffe Center (Framingham)	Dr. Irene Porro

The representative of each organization acts as a liaison for MASGC at their institution, which includes publicizing Space Grant activities and helping to screen and nominate students and programs for MASGC funding.

The National Space Grant Office requires two annual reports, the Annual Performance Data Report (APD) and the Office of Education Performance Measurement System (OEPM) report. The former is primarily narrative and the latter data intensive. Because the reporting timeline cycles are different, data in the two reports may not necessarily agree at the time of report submission. OEPM data are used for official reporting.